AGRICULTURAL MATERIALS

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This publication records information regarding the development of products of agricultural chemistry and R&D investigations by the Du Pont Company. It also contains published reports of investigations of agricultural organizations and other institutions on subjects of the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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2,4-D KILLED WEEDS SATISFACTORILY IN IOWA DURING 1949, DR. E. P. SYLWESTER OF IOWA STATE REPORTS

Where properly used, "very satisfactory" results were obtained with 2,4-D to kill weeds in Iowa during 1949, according to Dr. E. P. Sylwester, extension weed control specialist at Iowa State College, Ames, Iowa.

He credited timely applications, following directions as to dosage, and a fairly normal growing season over most of the state for the good results of using 2,4-D. In most isolated cases where poor results were obtained from spraying, Dr. Sylwester blamed failure to follow directions or poorly timed application.

There is evidence that more farmers relied on 2,4-D as their "ace-in-the-hole" card to keep down weeds in corn in 1949 than previously, Dr. Sylwester said.

Big Increase In Use on Roadsides

Biggest increase, however, was in spraying lawns, roadsides and fencerows -- weed problem areas in Iowa since the prairie sod was broken. Some counties carrying on intensive roadside spraying programs estimate that spraying roadsides had eliminated so much brush that snow removal had been reduced by 25 to 50 per cent.

Dr. Sylwester said that in almost every case, spraying small grain with 2,4-D gave excellent results, from the standpoint of both weed kill and survival of the small grain.

In corn, some breakage resulted from brittle stalks when farmers sprayed during a period when corn was growing fast. Since this has occurred two years in a row now, Dr. Sylwester thinks spraying in corn should be reserved for extremely weedy fields.

While in general excellent results were obtained from the use of 2,4-D, poor weed control was obtained in some places. For example, Dr. Sylwester pointed out a few cases where weeds were sprayed when they were old and tough, and some even after they had set seed. Also, dust on weeds along roadsides prevented good control in some cases when low gallonage equipment was used. He said users of 2,4-D are becoming more aware of the dangers of spray drift and are more careful when applying the chemical.

ROLE INSECTICIDES PLAY IN PROTECTING CONSUMER FROM HIGH COSTS DESCRIBED AT FEDERAL SECURITY HEARINGS

Insecticides are essential weapons in man's war on pests which annually cause losses up to four billion dollars, in the opinion Dr. F. C. Bishopp, assistant chief of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Testifying recently before the Federal Security Agency hearings regarding the use of pesticides in commercial production of fresh fruits and vegetables in Washington, Dr. Bishopp said in part:

"Fruits and vegetables would be unmarketable without the use of insecticides. The saving of life, the prevention of sickness, and the increase in food production that can be directly credited to the use of insecticides during and since World War II, are tremendous.

Role in Safeguarding Health

"On the other hand, there is no substantial evidence that any adverse effect on public health has resulted, in spite of the fact that nearly one billion pounds of insecticides are used annually in this country.

"Wormy apples, berries, cabbage, maggot-infested peppers, wormy corn, celery, and other crops, would reach the market fit only for garbage disposal unless the insect pests are controlled. Standards set on insect contamination by market inspectors and Food and Drug officials are a guarantee that such foods will reach the consumer in reasonably good condition." Dr. Bishopp added:

"This would not be possible without use of insecticides. Many products now enjoyed by the American public would no longer be found in our markets. The fruits and vegetables of high quality now reaching the consumer are not accidental. They are available by virtue of carefully planned and executed control

of insect pests and plant diseases through the use of insecticides and fungicides.

Insecticides Support High Standard of Living

"If restrictions are placed against the use of some of these materials, and inferior ones are substituted because they might be considered safer, the costs of production will increase materially, the consumer will be forced to pay more, and the standard of living in this country will be lowered.

"Federal entomologists, as well as those of State agricultural experiment stations, are concerned with the effective control of the insect hordes which in the absence of adequate control threaten the very existence of man on this earth. These entomologists continually keep before them the need for safeguarding the health of the public in their research and in their recommendations to the public for use of insecticides.

"Entomologists are anxious to have any hazards in the use of insecticides recognized, evaluated, and avoided. But they are also anxious to have recognized the tremendous advantages that have been gained and which can be more fully derived from the intelligent use of insecticides.

"The impact of insects on agriculture and the human economy is almost unbelievable. They have been the governing factor in shaping the history of nations. They are still playing an important role in pestilence and famine.

"The actual cost of insect depredations cannot be measured accurately. Estimates of the losses by various insect pests have been made and the figures even on a conservative basis are appalling.

Destruction Up To $4,000,000,000

"Four billion dollars annually is the most recent estimate of losses caused by insects, according to the Bureau of Entomology and Plant Quarantine.

"There are more than 80,000 different kinds of insect species in this country. Of these, no less than 6,000 cause damage. Grasshoppers cost farmers nearly 23 million dollars in 1946, a relatively poor hopper year. The corn earworm prohibits the profitable growing of sweet corn in many areas of this country. It also costs corn growers about 75 million dollars every year in reduction of field corn production.

"The European corn borer caused a loss which may reach 300 million bushels of corn in 1949. The hornfly reduces milk production by not less than 10 per cent in severe hornfly seasons. The boll weevil takes as much as half a billion dollars worth of cotton in years favorable to this pest. And the list of the various taxes levied by insects on the people of this country seems endless."

CHEMICAL CURIOSITY BECOMES VERSATILE DRUG

"Phenothiazine is a synthetic organic chemical, prepared commercially by combining diphenylamine -- a synthetic coal-tar product -- with sulfur, under the influence of heat and a catalyst. Up to 1938, phenothiazine was known to organic chemists only as a chemical curiosity that had been synthesized in Europe in 1885, and to entomologists as an experimental insecticide for destroying mosquito larvae and controlling the codling moth.

"In December, 1938, the U.S. Department of Agriculture, after considerable experimentation, first announced the discovery of the value of phenothiazine as an anthelmintic, or worm medicine, for swine. In the next three years the drug was found to possess exceptional merit for ridding farm animals, especially horses, cattle, sheep, and goats, of gastrointestinal roundworms." - Dr. Benjamin Schwartz, in "Science In Farming", U.S.D.A. Yearbook for 1943-47.

DEVELOPMENT OF PHENOTHIAZINE FOR CONTROL OF INTERNAL PARASITES IN LIVESTOCK OUTLINED IN U.S.D.A. YEARBOOK

In a few years since the discovery of its value as an anthelmintic or worm medicine for farm animals, consumption of phenothiazine jumped from 900 pounds to approximately 3,000,000 pounds annually, according to Dr. Benjamin Schwartz of the U.S. Bureau of Animal Industry.

Writing in the U.S. Department of Agriculture Yearbook for 1943-47, entitled "Science in Farming," Dr. Schwartz outlined the history of the development of this new vermifuge. He emphasized the discovery during the war that phenothiazine can be mixed with ordinary granular salt or with feed for self-medication by farm animals, especially by sheep, making necessary only occasional therapeutic dosages.

"A significant development in connection with the use of the drug as a worm killer was our wartime discovery that phenothiazine could be mixed with ordinary granular salt, and the salt mixture used safely to control sheep roundworms, the most injurious of the disease-producing agents that plague sheep," he said.

He pointed out that, besides destroying most of the common stomach worms and nodular worms, phenothiazine has "a significant anthelmitic action against other kinds of roundworms that live in the intestines of sheep, and also kills the eggs of roundworms."

U.S.D.A. Develops Scheme of Self-Medication

"About half of the drug passes unchanged through the sheep's digestive tract, and is, therefore, present in the droppings that contain the parasite eggs," he added. "So, it appeared logical and desirable to try to develop a scheme of self-medication that would insure that the sheep could take in the drug more or less continuously, and at the same time eliminate small quantities of it with the droppings. Accordingly, our first experiments to test the possibility were designed shortly after the discovery of the anthelmitic values of the drug. Mixtures of phenothiazine in feed were tested. Later we used phenothiazine in salt in various ratios, on the assumption that a sheep's natural craving for salt might insure a sufficient intake of the drug to reduce the animal's worm population and, at the same time, kill the eggs in the droppings.

"Considering the large number of eggs produced by parasitic roundworms and the relatively short period required for their development, it is quite evident that even a small number of worms not removed by treatment could pyramid to significant levels in a relatively short time in the late spring, summer, and early fall," Dr. Schwartz continued.

"In the past, stockmen had to resort, therefore, to the tedious task of costly and possibly dangerous treatment at 2-to-3-week intervals all summer. But a routine involving the more or less continuous intake of even small doses of a potent drug, however effective it might be to control parasites, could not be considered as being altogether free of chance, without extensive experimentation. Therefore, various possible risks had to be considered."

Long Tests Conducted Before Recommendations Made

Dr. Schwartz pointed out that it was necessary to determine through long and painstaking tests the effects on the health of adult sheep and lambs of a continuous intake of small doses of phenothiazine, to ascertain whether such treatments would arrest growth, injure the wool, impair reproductive functions, interfere with gestation, or prove injurious in other ways.

"Not until after two years of continuous experimentation with a flock of Government-owned sheep at Beltsville did we announce the value and safety of a phenothiazine-salt mixture, in the ratio of 1 to 9 to control sheep roundworms," he said.

He pointed out that this self-medication, at once curative and preventive, is not to be regarded as a substitute for the full therapeutic treatment with the drug, but rather as an adjunct to it.

Dr. Schwartz recommended that heavily infested sheep should be treated early in the spring with a full therapeutic dose -- about 1 ounce for adult sheep and one-half ounce for lambs weighing less than 60 pounds. He added:

"Following this treatment, the phenothiazine-salt mixture should be placed in an open container or trough that is protected from the weather. The entire flock should have access to it during the pasture season, when the weather is sufficiently mild to permit the normal development of roundworm eggs and the transformation of the larvae to the infective stage."

He pointed out that in most cases this procedure will keep lambs from getting an injurious load of parasites, but as an additional precaution the flock should be treated with a full therapeutic dose whenever it appears that the medicated salt is not holding the parasite in check.

NOTE: For further information on the use of phenothiazine for internal parasites of sheep, as well as of horses, mules, cattle, goats, and poultry, write for the booklet, "How to Control Worms in Livestock with Phenothiazine." Address your request to:

Editor, Du Pont AGRICULTURAL NEWS LETTER, Wilmington, Del.

ROCKY MOUNTAIN AREA CROP PROTECTION GUIDE

An up-to-date spray and dust schedule for control of plant diseases and crop-destroying insects in the Rocky Mountain states has just been published by the Du Pont Company. The folder contains the latest local recommendations based on observations of Du Pont field men in the Rocky Mountain area east of the Great Divide. Growers interested in obtaining a copy should write the Grasselli Chemicals Department of the Du Pont Company, 112 W. Ferry Street, St. Louis 7, Missouri.

TABLE ACCOMPANYING UNIVERSITY OF NEBRASKA AGRICULTURAL EXPERIMENT STATION PROGRESS REPORT ON WINTERING AND GRAZING HEIFER CALVES (story on next page)

Table shows supplements fed with prairie hay to wintering heifer calves November 26, 1947 to May 12, 1948, 168 days. Ten calves per lot. Hay fed ad lib. Heifers grazed for 120 days on native grass pasture, May 12, 1948 to September 9, 1948. Average weight into wintering lots, approximately 480 pounds per head.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Average daily feed per head, lbs.																
Prairie hay	10.7	12.1	13.8	13.0	13.2	13.0	12.8	12.7	11.2	12.2	13.1	12.1	10.3	10.5	12.6	13.0
Supplement (pelleted)	none	1.0	1.0	1.1	1.1	2.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Composition of supplement, per cent:																
Soybean oil meal	--	100.0	95.9	90.9	90.9	99.1	--	32.0	--	--	--	--	--	--	--	--
Cottonseed meal	--	--	--	--	--	--	97.4	32.0	--	--	--	--	--	--	--	--
Linseed meal	--	--	--	--	--	--	--	32.0	--	--	--	--	--	--	--	--
Dehydrated Alfalfa	--	--	--	--	--	--	--	--	97.3	94.0	84.3	47.0	--	--	--	--
Ground corn	--	--	--	--	--	--	--	--	--	--	--	36.0	100.0	94.2	86.7	81.5
Ground limestone	--	--	--	9.1	--	--	--	--	--	--	--	--	--	--	--	--
Monocalcium Phosphate	--	--	4.1	--	9.1	0.9	2.6	4.0	2.7	6.0	6.1	6.1	--	5.8	--	6.0
Urea	--	--	--	--	--	--	--	--	--	--	9.6	10.9	--	--	13.3	12.5
Average gain per head, lbs.																
Winter	4	99	152	118	154	190	144	135	146	112	146	127	41	40	99	141
Summer	199	158	112	131	120	117	115	132	133	144	112	144	176	170	145	134
Total	203	257	264	249	274	307	259	267	279	256	258	271	217	210	244	275

Five heifers from Lot 2 were fed 4.0 pounds of summer range pellets per head during the grazing period and gained an average of 235 pounds per head on pasture, or a total of 334 pounds per head; five heifers from Lot 6 handled similarly made a pasture gain of 185 pounds, or a total of 375 pounds per head.

UREA SATISFACTORY AS PARTIAL SOURCE OF PROTEIN FOR WINTERING AND GRAZING HEIFER CALVES IN NEBRASKA TEST

Wintering and grazing heifer calves fed mixtures containing urea in an experiment conducted at the Valentine Substation of the University of Nebraska Agricultural Station made satisfactory gains in weight. A total of 160 calves were involved in the study.

The urea was used in the form of "Two-Sixty-Two" feed compound, a product of the Polychemicals Department of the Du Pont Company. Ruminants -- cattle and sheep -- can convert "Two-Sixty-Two" into protein when it is properly mixed with high grade carbohydrates and other feed ingredients.

The tests at the Valentine Substation were conducted by its superintendent, E. M. Brouse, during the winter of 1947-48 and summer of 1948. They are described in the substation's Progress Report No. 15. These studies extend earlier work in Nebraska by Prof. Marvel L. Baker, involving rations containing mixtures of alfalfa and "Two-Sixty-Two" as protein supplement.

How the Various Lots Fared

In order for the reader to get an accurate picture of the diets involved and of the results obtained, we have obtained permission to reproduce the complete table given in the University of Nebraska report. It is on page 46.

It will be noted that the lowest gains in weight were in the "control lot", as the calves in that group received no supplemental feeding. The average gain of weight of these was only 203 pounds.

Four lots were given a supplement containing "Two-Sixty-Two." Of these, three had balanced diets, including added calcium phosphate, and the calves in them gained respectively 258, 271, and 275 pounds. (Lots 11,12,16). Lot 15, however, had "Two-Sixty-Two" without the phosphate supplement, and the weight gain of the calves in this case averaged 244 pounds.

By looking at the table it will be noted that the weight gains of the calves in lots 11 and 12, receiving supplements composed of either alfalfa or a mixture of alfalfa and corn, together with monocalcium phosphate and "Two-Sixty-Two" feed compound, compare favorably with those of lot 3, receiving soybean oil meal plus monocalcium phosphate as a supplement.

Calves Utilized Urea in Gaining Weight

Ample evidence that the addition of "Two-Sixty-Two" to the diet was utilized by the calves in gaining weight can be obtained by a comparison of lot 16 with lot 14. These two lots had essentially the same amount of monocalcium phosphate as a supplement to ground corn. Calves in lot 16 were fed a supplement composed of 12.5 parts of "Two-Sixty-Two" and 81.5 parts of ground corn, while those of lot 14 were given only ground corn. The results are very interesting:

those in lot 16 gained an average of 275 pounds, whereas those in lot 14 gained only 210 pounds.

In referring to these lots, Mr. Brouse said:

"Urea was included in supplements fed to Lots 11,12,15 and 16 to make the nitrogen content of these supplements approximately equal to that of most of the other supplements used. This was done on the theory that if the nitrogen was utilized by the rumen bacteria and converted into crude protein, the supplements should be approximately equal to supplements more generally used, if an adequate level of phosphorus intake was also provided." He explained that one of the purposes in using urea in this trial was to obtain further data on the practicability of using it as a replacement for some of the crude protein supplements such as the oil meals. It was also desired further to study the practicability of developing supplements based on corn and dehydrated alfalfa combined with "Two-Sixty-Two" and a phosphorus carrier.

PENNSYLVANIAN SCORES POTATO RECORD

A new eastern record in potato production on non-irrigated land is believed to have been made by Oscar Lauger of Youngsville, Pa., who grew 859½ bushels on a measured acre last year. He was honored recently at a banquet of the Pennsylvania Co-operative Potato Growers Association for this phenomenal yield -- enough Teton potatoes from one acre to meet the spud requirements of 412 persons for more than a year!

This record was hailed as indicating the greater potential returns possible when modern plant disease and insect control measures are used. The Lauger potato fields received regular spray applications of pest control chemicals, including "Parzate" fungicide to ward off onslaughts of "potato blight," a major cause of fewer and smaller spuds. National average yield of potatoes in 1949 was 211 bushels per acre, according to U.S. Department of Agriculture figures.

"RULES FOR SUCCESS" originally appeared as a guest editorial in the December, 1949 issue of THE AMERICAN FARM YOUTH, published at Danville, Illinois. It is reprinted here with the permission of the publishers of that magazine.

RULES FOR SUCCESS

by

James Q. du Pont
Extension Division
E. I. du Pont de Nemours & Co.
Wilmington, Del.

Half-frozen and nearly starved, the little party of seven adults and six small children trudged from the icy dock in search of warmth and food.

Newport, Rhode Island, was in the grip of a vicious winter that New Year's day of 1800 when these tired people landed after ninety-one days on the Atlantic from France. Their ship had twice lost its course, had run out of food, and suffered near-mutiny of its crew. It was given up for lost. That is why no friends were on hand to greet these Frenchmen when they arrived in America to find the "liberty, safety, and independence" which they had heard was here.

Not long after this arrival one young man of the party started a little business. He wanted to make -- he practically had to make -- some money to feed and clothe and shelter his wife and children.

Today that little business is a very big business. In cold figures it has assets of about one billion six hundred and eighty million dollars. One billion six...but hold on! Right here I can feel you, my reader, saying "Look -- I'm a farm youth interested primarily in farms and farming, not giant corporations and billions in assets. Why not write about something of use to me when our magazines, like 'The American Farm Youth' invite you to do so?"

Well, you're right to challenge me on that, and here is my answer. The young man who started the little business that grew steadily to the big business wanted to be, yes, studied to be, guess what? a farmer! He dreamed of developing the land in these new United States, of growing things from the

good earth like you do, perhaps, when your father's and mother's work is done. But "Lady Luck" and "Cy Circumstance" sent him into manufacturing by a train of events too long to tell you here. -- There is one thing I can tell you though, and it is the very heart of this story.

This quiet, practical youth had a set of business rules, a set of principles and policies. He would have used these on his "dream-farm" as he and his descendants have used them in the development of the highly successful business just mentioned. And I know of no way that I can help you more than by setting down these simple, homely rules; this recipe for success. Read and think deeply about the points below. Try to "shoot them full of holes" and prove them false or foolish if you can. Discuss them with your parents and your friends, particularly with the girl or man you may be planning to marry. And then if, after all these tests, they still ring true, make sense to you, then why not resolve to use them for all they're worth, unless you have a better set, of course.

Here are "The Nine Rules," with some comments of my own to point up the applications to farming:

1. The originator of the business selected the business he entered for a good reason; he knew the product was needed. It goes without saying -- the world needs food and fiber just as much as ever.

2. He knew how to make his product. We call this job know-how today, and everything that you boys and girls can do to learn more about the how and why of producing food and fiber will be like money in your banks.

3. He was determined to make his product as good or better than the best in competition. Competition, courage, imagination, and hard work in farming and in manufacturing have done much to make our country what it is today.

4. Improve raw materials, improve methods, improve quality. Even if, momentarily, you have your competition "on the run," never be satisfied to let well-enough alone.

5. Thrift and economy. The business that I refer to does not yet, and I hope never will, consider itself wealthy enough to indulge in anything wasteful! Save, save, save!

6. Additional capital obtained and applied when needed. Now that's a dry and humdrum statement, isn't it? But let's look beneath the surface and see what this one means. It means that the management of this company has always so behaved, yes, -- so been, that when it had to borrow money, for working capital or other purposes, it could do so. A farmer who has to borrow

money is seldom turned down by the banker if his reputation, over the long years has been good!

7. Plow back, into the business, a heavy portion of profits. I imagine practically all successful farmers have done this. Instead of "milking dry" their land and stock and equipment, to make big quick profits, they have taken much of their earnings to replenish the soil, build up stocks by careful breeding, etc., and to purchase new and better equipment.

8. Diversify. Since the beginning, but particularly since the early 1900's, this company has diversified its fields. It makes many products, not just one. I suspect that the danger of "putting all your eggs in one basket" applies to farming as well as to manufacturing.

9. Finally, the originator of this business believed in owner-management and personal attention to the business. I can imagine few industries that need this rule more than does farming. Don't lease your land except in special cases. Work it or sell it! This rule is so important that I hope you'll forgive me if I repeat it. The originator "believed in owner-management and personal attention to the business!" Indeed, I'll go the limit and say, there is simply no substitute for this pair of success breeders.

These then are the rules. If in the years to come even one of you boys or girls shall have been made more successful and your farm more productive and profitable by the use of these points then I shall feel more than well rewarded for this effort of mine. And should you, by any chance, ever come to feel grateful to me, as do I to those who gave these points to me, then here is a suggestion. Stop off sometime in Wilmington, Delaware, and inquire if you will about three places. First, a little old powdermill on the banks of the Brandywine; second, a vast chemical plant across the Delaware River; and third a certain cemetery in Christiana Hundred. The mill will give you the humble beginnings of a now very successful business. The big plant will show you just what good management can and does accomplish under our economic system of generous profits and wages for those who perform above the average. (When you see it, incidentally, ask yourself if a system of handouts for poor management and lazy workers could possibly have achieved the same results.)

Finally, in the cemetery, a stone dated June 21, 1772 - October 31, 1834 will introduce you to the man who wrote these rules and lived them. Whisper thanks to him if you're then so inclined but only in case his rules shall have helped you greatly. He wouldn't expect your thanks for less. He was that kind of a man.

Higher tomato yields were obtained by the use of fungicides in experiments conducted by Dr. J. Walter Hendrix, plant pathologist at the University of Hawaii. Dr. Hendrix has given us permission to describe his results, as originally told in a Honolulu ADVERTISER story by Louise S. Jessen, agricultural editor of the University of Hawaii.

FUNGICIDES FOUND EFFECTIVE IN PROTECTING TOMATOES FROM LEAF DISEASES IN UNIVERSITY OF HAWAII TESTS

"Zerlate", "Fermate", and "Parzate" fungicides scored high in tests that showed how tomato crop yields in Hawaii might be raised $93 to $1,600 per acre using chemicals to control early and late blight and other leaf diseases responsible for costly plant losses.

Dr. J. Walter Hendrix, experimental station plant pathologist at the University of Hawaii College of Agriculture, recently reported the tests conducted over the past five years.

Disease Losses High

"During the past decade the tomato crop has brought a half million dollars each year to Island farmers," Dr. Hendrix said. "In the peak years 1943-45, the crop was valued at a million and a quarter dollars.

"Yet each year Hawaii farmers lose a large part of their tomatoes from leaf diseases. This loss probably averages 20 percent of the crop, a conservative estimate, as, at times these diseases wipe out virtually the entire plantings."

Dr. Hendrix explained that in the first tests, made in 1944-45, seven different spray materials were used. Those giving the largest net increase in crop value were "Zerlate", tribasic copper sulfate, "Fermate" and Yellow Cuprocide.

"Zerlate" Adds $1,600 Per Acre In Crop Yields

"In all tests, the plants were sprayed from seven to twelve times," he said. "In the 1944-45 test 'Zerlate' and tribasic copper sulfate increased the value of the crop by approximately $1,600 per acre. 'Fermate' and Yellow Cuprocide each provided increases of more than $1000.

"Even the less effective materials gave increases of about $800 per acre. The 1946-47 tests were similar to those of the first year.

"In the third test, the net increase was somewhat less than the others, ranging from $93 for 'Parzate' fungicide to $45 for tribasic copper sulfate.

Nevertheless they were sufficient to justify the expenses of spraying." Dr. Hendrix summarized reasons for the lowered returns of the third tests as lowered tomato prices as compared with 1944-45; introduction of a new hybrid plant resistant to gray leaf spot, not available for the earlier tests; continuance of tests during spring, when conditions were less favorable to diseases.

In computing the net value of increased crop yields, Dr. Hendrix included in his costs labor and spray materials.

Research Continuing on Hybrid Varieties

All tests were made during winter months when leaf spot diseases are more common and severe than at other seasons in Hawaii. Tests were run during the first two winters at Poamoha, the college experimental farm in north Oahu. The third test was made at the branch station farm in the Makawao district north of Maui.

Common leaf diseases include gray leaf spot, early blight, late blight, and Septoria leaf spot. Plant breeders at the experiment station have developed hybrid varieties that resist gray leaf spot, but these are not well adapted to the higher elevations.

Scientists are working on varieties resistant to all four diseases, Dr. Hendrix said, but, "until such a variety is developed," he added, "local farmers must depend on spraying as a control measure."

FURFURAL PRODUCTION FACILITIES INCREASED

A new plant to double the facilities at Niagara Falls, N. Y., for the production of adiponitrile has been announced by E. I. du Pont de Nemours & Company. Adiponitrile, a chemical intermediate of nylon, is made in Niagara Falls from furfural, which is manufactured from corncobs and oat hulls.

Ross Hare, manager of the plant, said research and development in the Niagara Falls laboratories during 1949 firmly established the process in competition with alternate methods of manufacture from derivatives of coal and petroleum.

Furfural for the manufacture of adiponitrile is made in Memphis from agricultural by-products and shipped to Niagara Falls. The nylon intermediate is shipped from here to another Du Pont plant at Belle, W.Va., for further processing.

"This is a lot of new business coming out of research," Mr. Hare said. "When the new project is finished about 400,000,000 pounds of corncobs and oat hulls will be used annually in the manufacture of furfural for the Niagara Falls plant."

DU PONT SETS PEACETIME PRODUCTION RECORD WITH INCREASED MANUFACTURING FACILITIES

E. I. du Pont de Nemours & Company reported a new peacetime production record in its annual report for 1949.

The larger volume of goods produced resulted chiefly from increased manufacturing capacity for nylon textile fibers, tetraethyl lead, cellophane, plastics, and acetate rayon.

Du Pont's sales volume in 1949 was approximately 6 per cent larger than in 1948, the previous record year. Roughly half of the increase was due to a greater physical volume of goods sold and half to higher sales prices. Sales for the year were $1,025,000,000.

Although price changes resulted in an average increase of 3 per cent in the company's sales price index for 1949, by the end of the year this index was slightly lower than at the end of 1948.

Noting the shift in general business conditions during 1949, the report referred to keen competition in most of the industries in which the company operates, where supply now meets or exceeds demand.

Large Expenditures for Research

Crawford H. Greenewalt, president of the company, pointed out that Du Pont spent $33,000,000 for research during 1949, excluding cost of new facilities, as compared with $31,000,000 in 1948.

"The company has for many years adhered to a policy of growth through aggressive research and through the development of new products to fill public needs," Mr. Greenewalt declared. The growth of Du Pont's operating assets, which has averaged about 9 per cent a year over the past 25 years, "is a measure of services rendered...to the American economy."

This policy of aggressive research has resulted in many new products which were only laboratory curiosities in the recent past, he said.

"In 1949 about 60 per cent of the company's sales resulted from products that were unknown or in their commercial infancy twenty years ago," Mr. Greenewalt said. With the development of new products and growth of the company, Du Pont sales are about 7 per cent of the aggregate for American manufacturers of chemicals and allied products. The company deals with more than 70,000 customers, most of which are small businesses, he reported.

Cooperation Between Big and Little Business

"The value added by the customers' manufacturing efforts to the products purchased from the company is, on the average, many times greater than

the price received by Du Pont. There is a cooperative relationship between large and small businesses, which contributes much to the American economy and to American living standards," he said.

"There has been a growing disposition in certain government circles to attack business on the ground of mere size; to hold that size is synonymous with monopoly; and to recommend general legislation that would limit corporate size or, alternatively, subject large corporations to government control," he said. "These trends in government thinking can profoundly influence the further growth and prospects of the company and of business generally."

"Any effort to penalize success by placing arbitrary limits on business growth, and so to thwart the customer in the free exercise of his judgment, cannot fail to have adverse effects on our economy and our standard of living," Mr. Greenewalt asserted.

Production Facilities Increased and Improved

During 1949, Du Pont spent $86,000,000 for additional manufacturing capacity and service facilities, and for improvement of existing equipment and facilities, principally for the manufacture of nylon products, titanium pigments, polyvinyl alcohol, "Cordura" rayon tire yarn, and methanol.

Construction of a plant for production of "Orlon" acrylic fiber was started at Camden, S.C., during the year. Scheduled to go into operation this summer, it will be the first plant to manufacture this new fiber on a commercial basis.

The company's safety record in 1949 was the best in its history. One time-losing injury occurred for each 1,400,000 man-hours worked. The rate is substantially less for the company than for the chemical industry as a whole, which rate in turn is less than that of all industry.

MANY SPRAY, DUST SCHEDULES FOR 1950 RECOMMEND USE OF METHOXYCHLOR ON FRUIT, VEGETABLE, FORAGE CROPS

By R. M. Roberts

Continuing research with residual insecticides at experiment stations and colleges throughout the country has turned up a barrage of official recommendations for the use of methoxychlor on fruit, vegetable, and forage crops.

The combination of effectiveness, plus an extremely low order of toxic hazard for both human consumers of food crops and livestock fed on treated forage crops, has been constantly winning more enthusiastic methoxychlor endorsement.

In state-approved spray and dust schedules, published to guide growers during the 1950 season, methoxychlor is recommended for control of a variety of specific insect pests, on a variety of crops. In each case, these endorsements represent the results of several years of testing the chemical under all sorts of local climatic conditions.

Methoxychlor Protects Cranberries in Washington

Cranberries are a relatively new crop in the state of Washington and growers say they would have no crop to harvest without the protection of insecticides. From the cranberry-blueberry experiment station at Long Beach, Wash., comes a recommendation that methoxychlor be used to control cranberry fruitworm, fireworm, tipworm, girdler moth, and oystershell, and San Jose scale. Three applications during the growing season are needed, using two pounds of the 50% wettable product per 100 gallons of spray.

In Massachusetts methoxychlor is offically recommended by the University of Massachusetts for control of plum curculio in deciduous fruit. In interplanted blocks of peaches and apples, the recommendation is a spray of three pounds of the 50% wettable powder per 100 gallons of water at the shuck-split stage, followed by two more applications, seven to 10 days apart. Tennessee has also recommended methoxychlor to control curculio in apples and peaches.

Tests In Bean Fields Successful

Where tests in bean fields have been conducted methoxychlor has been found to be a highly effective control against Mexican bean beetle. In New York, New Jersey, and Pennsylvania, state recommendations name methoxychlor for use against both this beetle and the leafhopper. In Mississippi, recommendations favor methoxychlor for not only Mexican bean beetle but also to protect beans against the bean leaf beetle, flea beetle, vegetable weevil, and cucumber beetles. In Pennsylvania it is also recommended to control seed corn maggot on both corn and lima beans, while in New Jersey it is urged for corn ear worm infestations on beans.

Cucurbits are extremely sensitive plants, foliage and blossoms often being damaged by insecticides. Here is another situation in which methoxychlor behaves as though it had been designed for the specific job. Producing no plant

injury, yet effectively controlling insects that infest cucurbits, it has won recommendations in New Jersey to control both striped and twelve-spotted cucumber beetle and squash vine borer; in Delaware to control the same two beetle species; in Pennsylvania to control all cucumber beetles; in New York to control striped cucumber beetle.

Oregon and Colorado Experiences With Cherries

Wormy cherries are another distressing agricultural problem now being solved through the use of methoxychlor. Oregon State College has released a bulletin on control of the cherry fruit fly. Methoxychlor was recommended as the opening gun in the campaign. Colorado is recommending it to control cherry fruit worm.

Protection not only for human consumers but also for livestock that will be fed on fodder from crop by-products prompted other state recommendations. In Florida methoxychlor was given the nod to control ear worm on sweet corn, where stalks are used for cattle feed.

In Oregon it was recommended for pea weevil control where pea vines are to be used for silage.

At Colorado A. & M. College, a problem was the control of alfalfa weevil in hay fields. A highly toxic insecticide was in common use among hay growers, with the customary disadvantages of hazard to stock unless dusting or spraying was discontinued a month before mowing. A spray of three pounds of 50% wettable methoxychlor per acre was substituted as a trial. Results were practically equal to those with the much more deadly insecticide, so this year the college is recommending that alfalfa growers use methoxychlor for weevil control just before cutting.

Connecticut Uses on Elm and Fruit Trees

At Stamford, Conn., a tree treating service has found methoxychlor an effective control for elm bark beetle. At the same time, Connecticut recommendations for 1950 insect controls on fruit crops have named methoxychlor for a variety of uses -- for plant bug and curculio on apples, cherries, plums, prunes and peaches; for Japanese beetles, rose chafers and leafhoppers on grapes; for plum and quince curculio and codling moth on pears; for fruit worms and Japanese beetles on raspberries.

In Delaware methoxychlor has been recommended for tomato fruit worm and garden flea hopper. In Pennsylvania it is stressed to control asparagus beetle. In Massachusetts it is the approved material to stop oriental fruit moth damage in peach orchards.

HALF MILLION HEAD OF CATTLE SAFELY TREATED IN FLORIDA WITH DU PONT LIVESTOCK SPRAY AND DIP

By Norman P. Rockwell
Grasselli Chemicals Department
E. I. du Pont de Nemours & Co.

Large-scale usage of Du Pont Livestock Spray and Dip No. 30 has confirmed its safety and its effectiveness against a variety of parasites.

This new product was introduced to help fight a serious pest problem confronting cattlemen of Florida. "Texas fever" ticks, potential carriers of piroplasmosis, which is a highly dangerous cattle fever, were found on cattle in Florida last year.

An energetic campaign, supervised by state and federal officials, was promptly launched to eradicate these ticks.

Production of Du Pont Livestock Spray and Dip No. 30, a properly blended combination of DDT and benzene hexachloride, was started at the Houston, Texas, works of the Grasselli Chemicals Department of the Du Pont Company last summer to help in this eradication program.

Results of Widespread Use Related

It is now possible to relate some of the results of its use. In Florida at least one-half million head of beef cattle have been treated with Du Pont Livestock Spray and Dip No. 30. Hundreds of thousands have been treated in other states. Among all of these, there have been no authenticated records of deaths of either adult or young stock resulting from the use of this product.

All cattle in the Florida areas where cattle fever ticks have been found were dipped. Although no ticks have been found on cattle following the first dipping, periodic treatment is being continued to make doubly sure that the pest is eradicated. This large-scale usage has confirmed the effectiveness as well as the safety of this product.

The physical properties of this formulation have proven to be satisfactory. It works well in spray rigs or dipping vats. It mixes well with water, wets easily, and stays well suspended for considerable periods of time. In dipping vats after a period of non-use, the active ingredients can be resuspended by agitation more readily than in the case of many emulsion formulations. There has proved to be very little selective removal of the two insecticides -- DDT and benzene hexachloride -- so that the relative concentrations of these two materials remain constant at all times. This is a desirable feature in products containing more than one insecticide. When the vat is recharged by adding more Du Pont Livestock Spray and Dip No. 30, the proper ratio of insecticides will be maintained.

Product's Uses Being Enlarged

In addition to being effective against the cattle fever tick, Du Pont Livestock Spray and Dip No. 30 has been found to be useful for controlling various other ectoparasites of livestock.

In Texas, it killed the Gulf Coast ear tick on cattle when applied as a spray; no reinfestation occurred during the three weeks the animals were under observation.

Cattle lice have been controlled with one application. Likewise, one treatment has given several weeks' control of hornflies. It has also been found to be highly effective against insect pests of sheep and goats, and to control effectively many insects that infest farm premises.

The standard bag of Du Pont Livestock Spray and Dip No. 30 weighs 11 pounds. For cattle, sheep, and goats, one bag (11 pounds) should be mixed with 100 gallons of water. When used on farm premises, four bags (44 pounds) should be used in 100 gallons of water. For large users, a 55-pound bag is available.

FILM DEPARTMENT CREATED

E. I. du Pont de Nemours & Company has created a new department to be responsible for research, production, and sales for all products formerly handled by the Cellophane Division of the company's Rayon Department. The new organization, known as the Film Department, has as its general manager Donald F. Carpenter, former chairman of the National Munitions Board and long-time Du Pont employee. Arlington Kunsman, formerly manager of the Cellophane Division, is assistant general manager.

The step was taken because the business of the Cellophane Division had greatly expanded since the war. It was pointed out that the Film Department has no connection with the operations of the Du Pont Company's Photo Products Department, chief among whose products is photographic film.

The Film Department is the company's primary agency for handling films other than photographic, including the various types of cellophane film, both plain and moistureproof, cellulose acetate film, polythene film, cellulose sponges and sponge yarn, and "Cel-O-Seal" cellulose bands.

TESTS AT TEXAS STATION SHOW "CERESAN" M SEED DISINFECTANT OFFERS RICE GROWERS MAJOR SAVINGS

Experiments with rice seed at the Rice-Pasture Experiment Station, near China, Texas, showed that "Ceresan" M seed disinfectant was superior to other chemicals previously used to protect rice seed against common fungus diseases.

Dr. Edgar C. Tullis, plant pathologist of the station, conducted the experiments, using five different chemicals. He said that growers of rice should be able to effect considerable savings by using "Ceresan" M instead of other chemicals, because it was cheaper than some of the others, and besides, only half as much is needed.

The active ingredient in "Ceresan" M is ethyl mercury p-toluene sulfonanilide, and it can be used either as a dust or as a slurry treatment.

Use of Seed Treatment Increasing

"Where products formerly used in slurry form required two and one-half pounds of fungicide to one gallon of water, 'Ceresan' M can be used at the rate of one and one-fourth pounds to the gallon," he said. Indications are that additional savings may be made by reducing the rate of seeding from about 100 to 130 pounds to approximately 75 pounds an acre in future planting. This is due to the seed protection given by the new fungicide against fungi on the seed or in the soil.

"Reports over the Sabine area indicate that about half the total rice planted was treated last year," Dr. Tullis said, "and as far as we know little or no rice was treated three years ago. Two years ago was the first year any appreciable amount of fungicides were used for seed treatment.

"Fungicides are insurance for a good stand of rice from the first planting, and especially are effective on early planted rice," he said.

Five fungicides were used in the experiment to determine their effectiveness. This was the second year this experiment has been conducted for Bluebonnet and Rexoro, the more commonly planted varieties, and it will be conducted for two or three more years on the same varieties unless varietal differences indicate a need for experiments on other varieties.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY